

E-coli Violations in Recreational Waters: Discussion of Agency Roles



Division of Water Quality

Utah Division Water Quality
December 17, 2009

Overview of Presentation

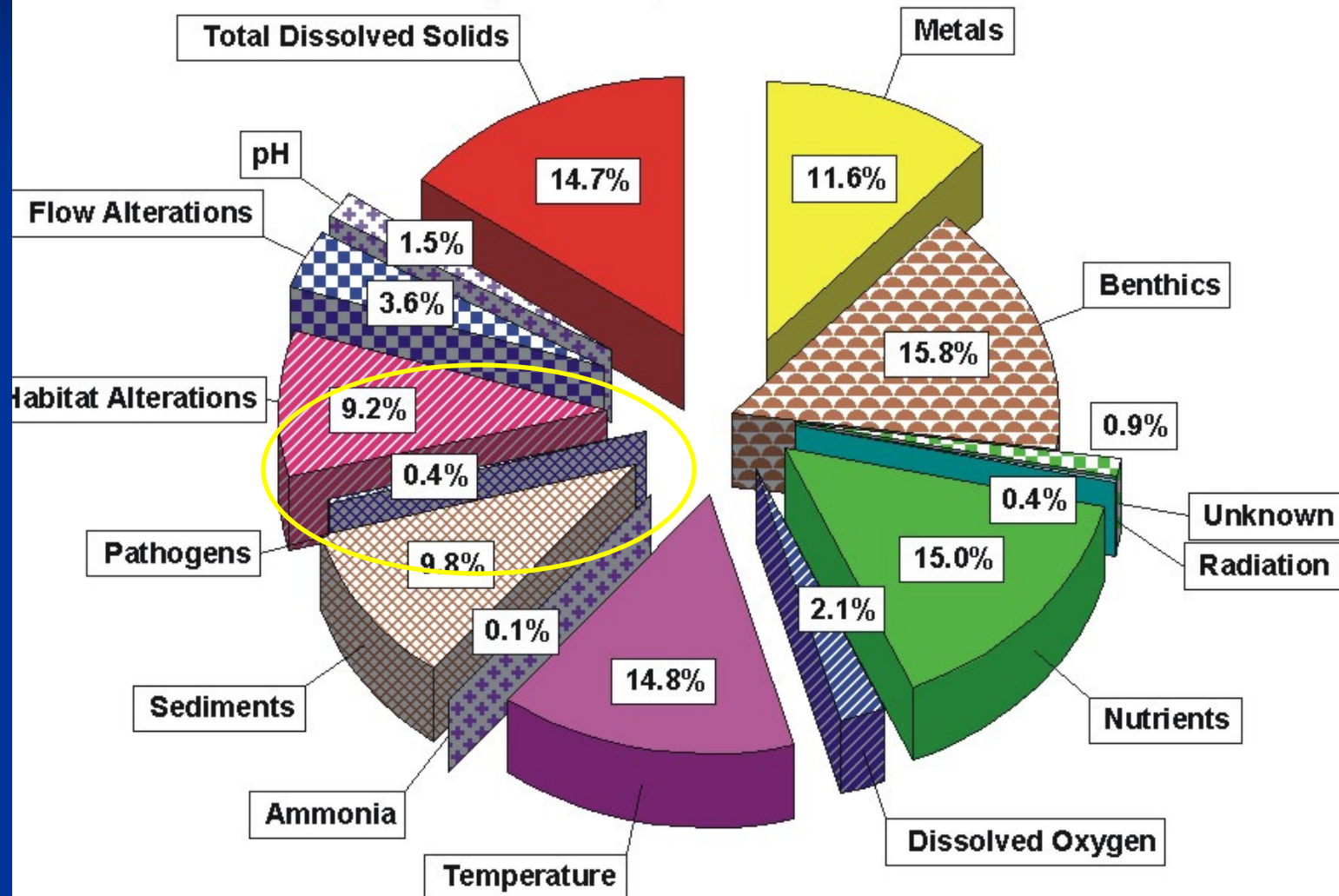
- *E. coli* Water Quality Standard
- Assessment Methodology
- Field Monitoring Methodology
- Voluntary Monitoring Approach
- Case Studies:
 - North Fork Virgin River
 - Utah Botanical Center
- UDWQ's Role in Agency Partnership

E. coli Numeric Standard

- For Drinking Water and Secondary Contact uses:
 - Acute standard
 - Not to exceed 206 CFUs per 100 ml as 30 day geometric mean
 - Chronic standard
 - Not to exceed 668 CFUs per 100 ml in one sample in 30 days
- For Primary Contact use:
 - Acute standard
 - Not to exceed 126 CFUs per 100 ml as 30 day geometric mean
 - Chronic standard
 - Not to exceed max of 409 CFUs per 100 ml in one sample in 30 days
- Geometric mean is based on no less than 5 samples equally spaced over 30 days.

Causes of Stream Water Quality Impairments

2008 Integrated Report Statewide Assessment



Impacts on Recreational Use

(Class 2A & 2B Waters)

- Fecal bacteria increases risk of illness.
- 1968 Federal WQ criteria for fecal coliforms set at 200 CFU/100mL water.
- 1986 Federal WQ criteria for *E. coli* set at 126 CFUs/100mL (risk level no more than 8 illnesses/1000 swimmers)



UDWQ's Bacteriological Monitoring Strategy

- Not feasible to monitor for all pathogens, thus we will analyze for *E. coli*, an indicator of fecal contamination.
- Tier 1: Focus efforts at high-use and 2A waters
- Tier 2: Intensively sample “hot spots”
 - Collect 4 additional samples when results > 126 CFU (MPN) per 100ml
 - Samples should be collected within 30 days of initial collection and evenly spaced to reduce bias.
- Use Idexx Quanti-Tray 2000 methodology for collection.

Cooperative Monitoring

- Such intensive monitoring not feasible on a statewide basis given limited monitoring resources thus will use cooperators to assist in collection (Tier 2).
- Form an agreement with cooperators:
 - DWQ: Assist funding equipment
 - Cooperators: Assist in collecting samples
- Cooperators include: BLM, USFS, NPS, USU Ext, Westminster, SL County, Western Waters, volunteers

Assessment and Attainment

- Waterbodies will be listed on the 303(d) list of Impaired Waterbodies if the 30-day geometric mean exceeds the acute water quality standard.
- For small datasets, if the standard is exceeded, follow up monitoring will be conducted to fully assess impairment.
- Once listed, the TMDL process will begin to determine sources and implement management strategies to reduce loading.

Targeted State Parks

(# 2006 visitors)

- Deer Creek (308,024)
- Willard Bay (268,537)
- Utah Lake (234,175)
- Bear Lake (208,948)
- Palisade (188,963)
- Antelope Island (184,752)
- Jordanelle (164,226)
- Sand Hollow (151,737)
- Yuba (109,712)
- East Canyon (91,739)
- Quail Creek (89,738)
- Scofield (84,705)
- Rockport (79,941)
- Hyrum (58,089)
- Otter Creek (51,854)
- Gunlock (48,196)
- Starvation (46,116)
- Steinaker (40,288)
- Huntington (40,036)
- Escalante (30,766)
- Red Fleet (25,742)
- Piute (23,808)
- Millsite (17,925)

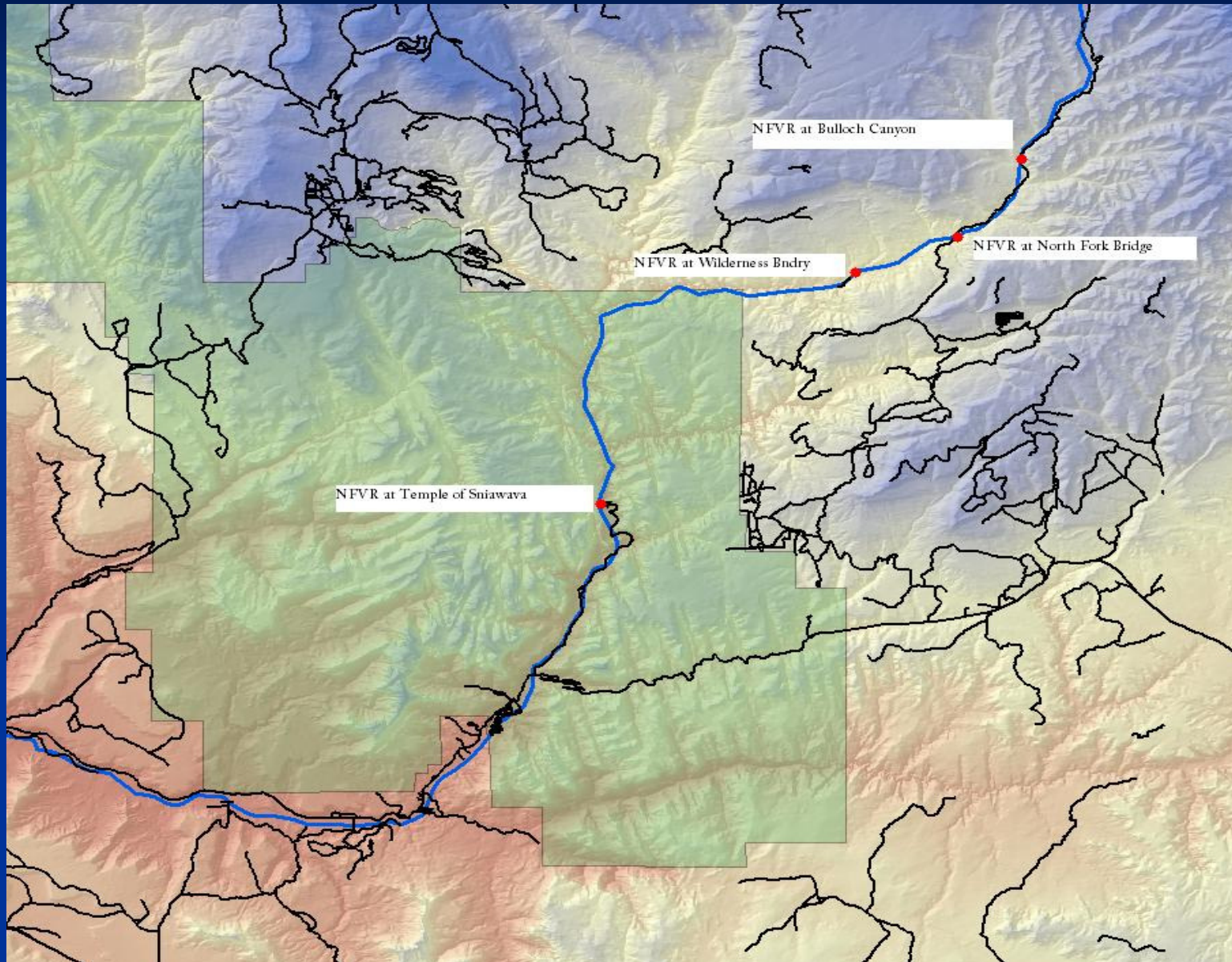
North Fork Virgin River *E. coli* Exceedances



Area of Concern

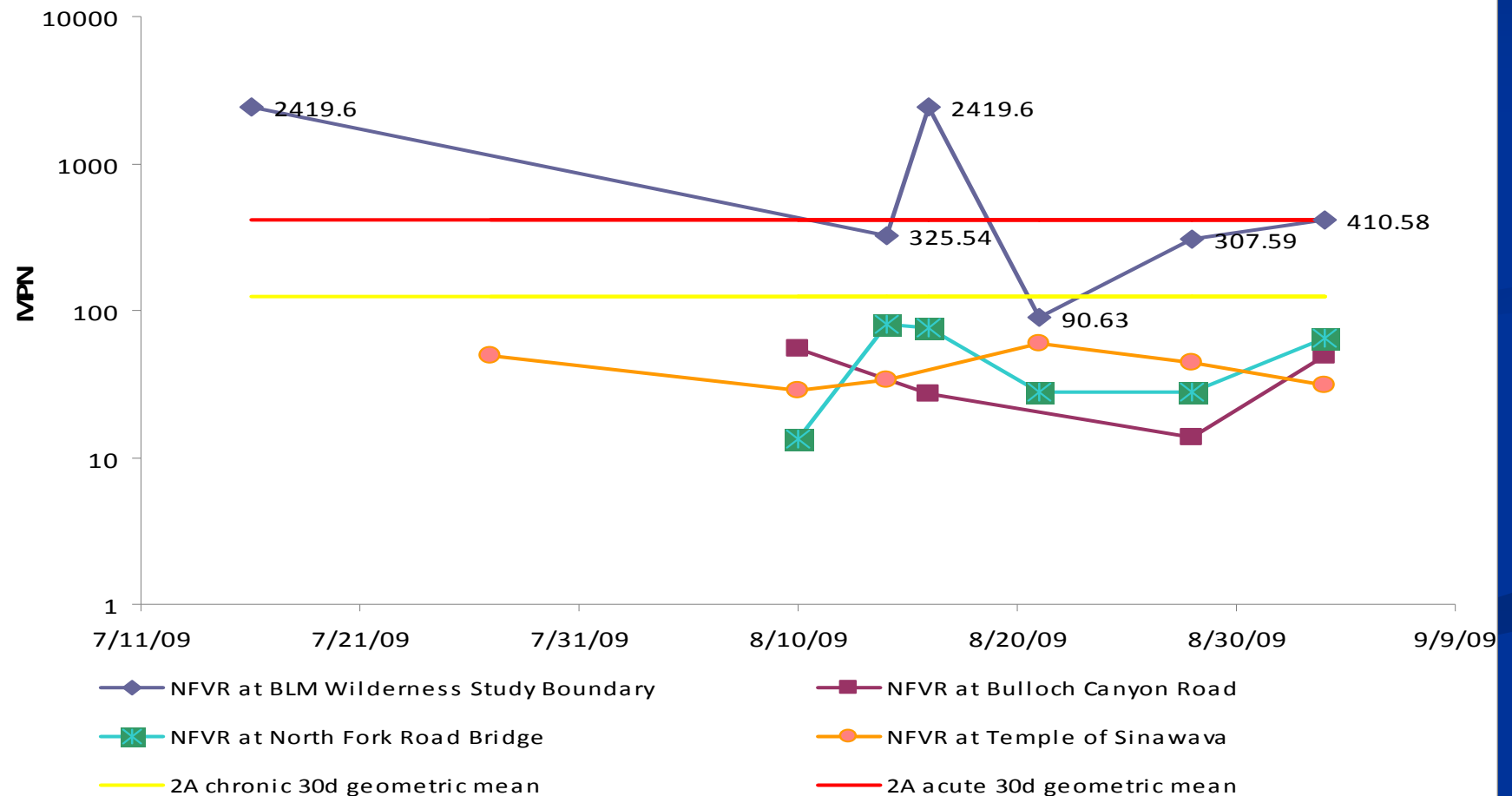


NPS Sampling Locations



Data collected by David Thoma, National Park Service Hydrologist

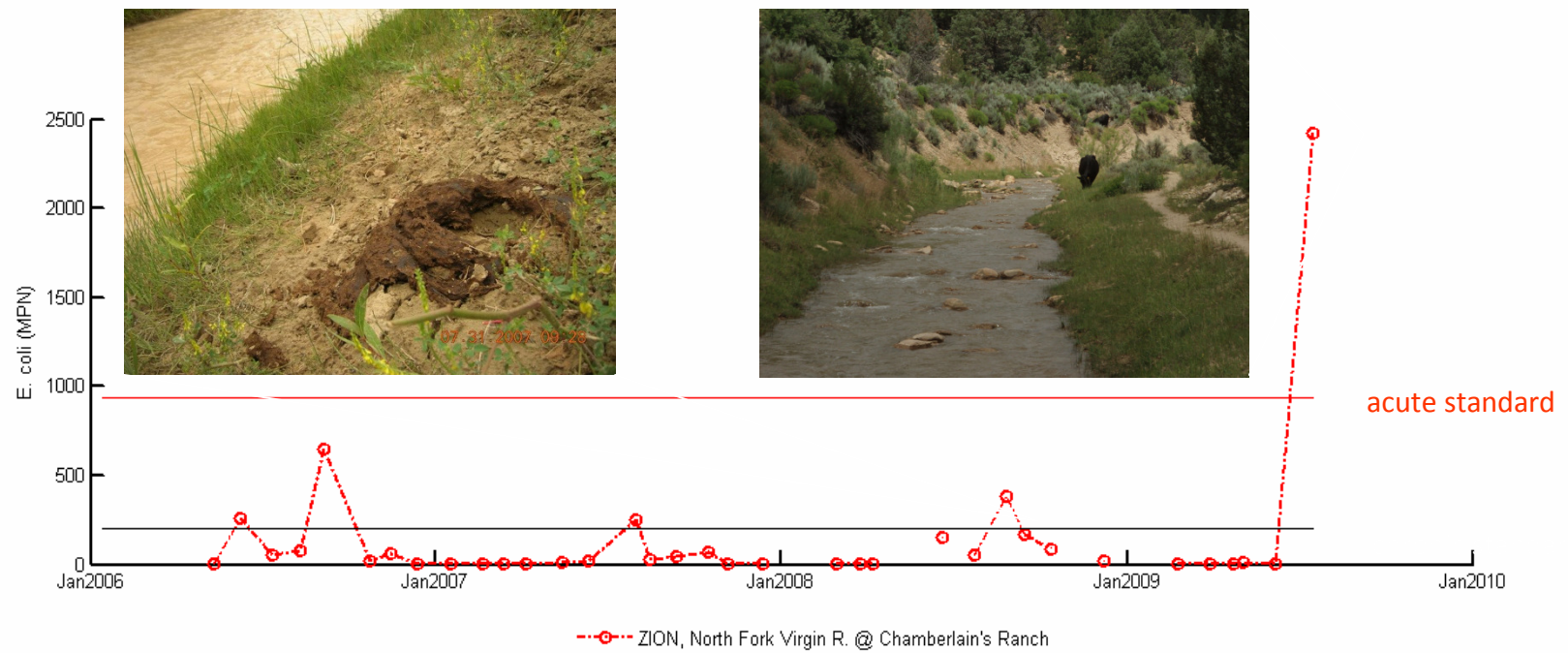
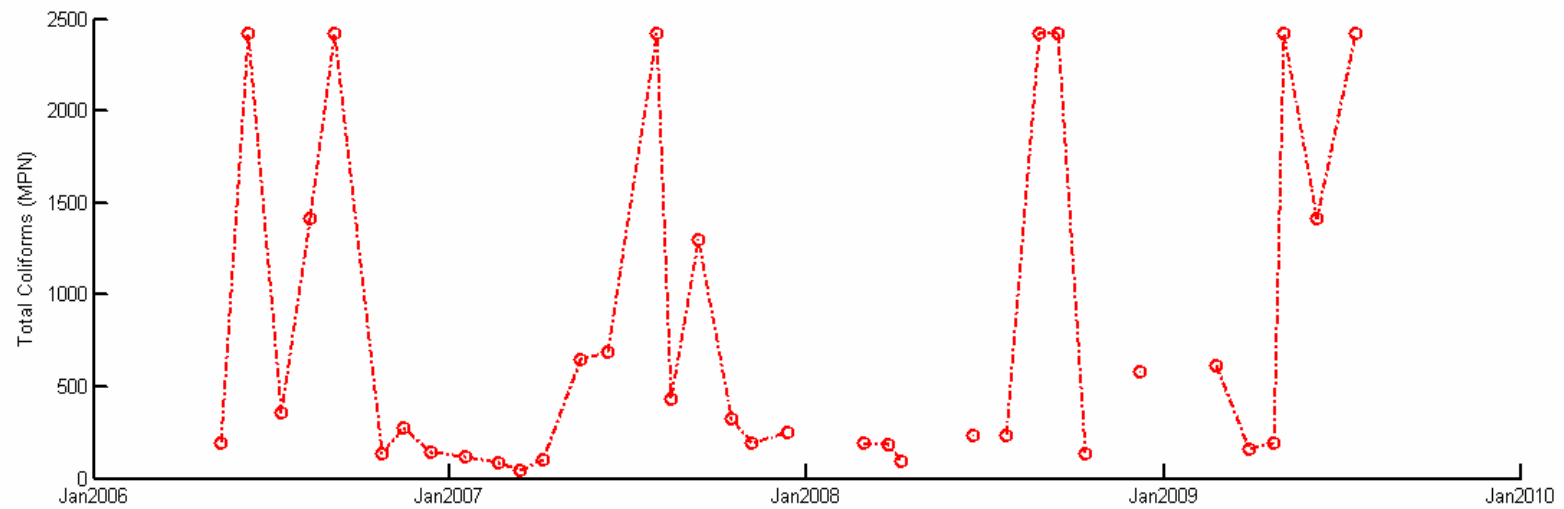
E. Coli.



Potential Sources of E. coli

- Livestock
- Humans
- Wildlife





Zion NP Warning Sign

Water Contamination

Water quality monitoring has determined that the water in the North Fork of the Virgin River between the Chamberlain's Ranch Trailhead and Deep Creek is unsafe for swimming and similar recreational contact.

Until further notice, in this part of the river:

1. Avoid deep wading and ingestion of untreated water,
2. Bring sufficient drinking water to reach Deep Creek before resupply, and
3. Always treat river and spring water before drinking.

Please contact the Zion NP Backcountry Desk if you have questions. 435-772-0170.



Glenn Canyon Beach Closing Strategy

- **Resample** if *E. coli* concentration > 126 MPN/100mL (3 spatially distributed replicates)
- **Swimming Advisories** are issued if the geometric mean > 235 MPN for high-use sites and if one sample > 235 MPN for random sites. When the arithmetic mean from resampling > 126 MPN, signs are removed.
- **Beach Closures** are issued by Superintendent are issued if the arithmetic mean > 126 MPN. Area posted and visitors are notified via handouts. Resampling will continue daily.
- **Beach reopening** will occur when the most recent 2-day, 3-day, 4-day, and 5-day geometric means are all < 126 MPN. A minimum of 5 sample values is required to reopen a beach.

Next Steps...

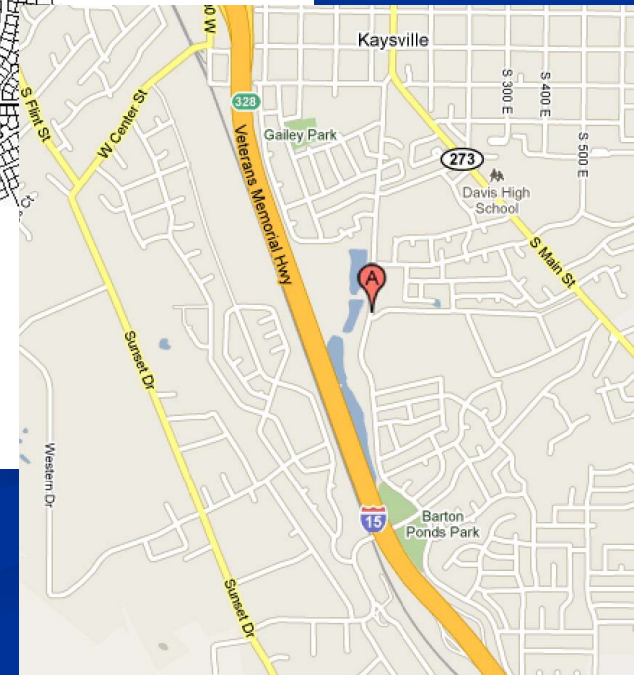
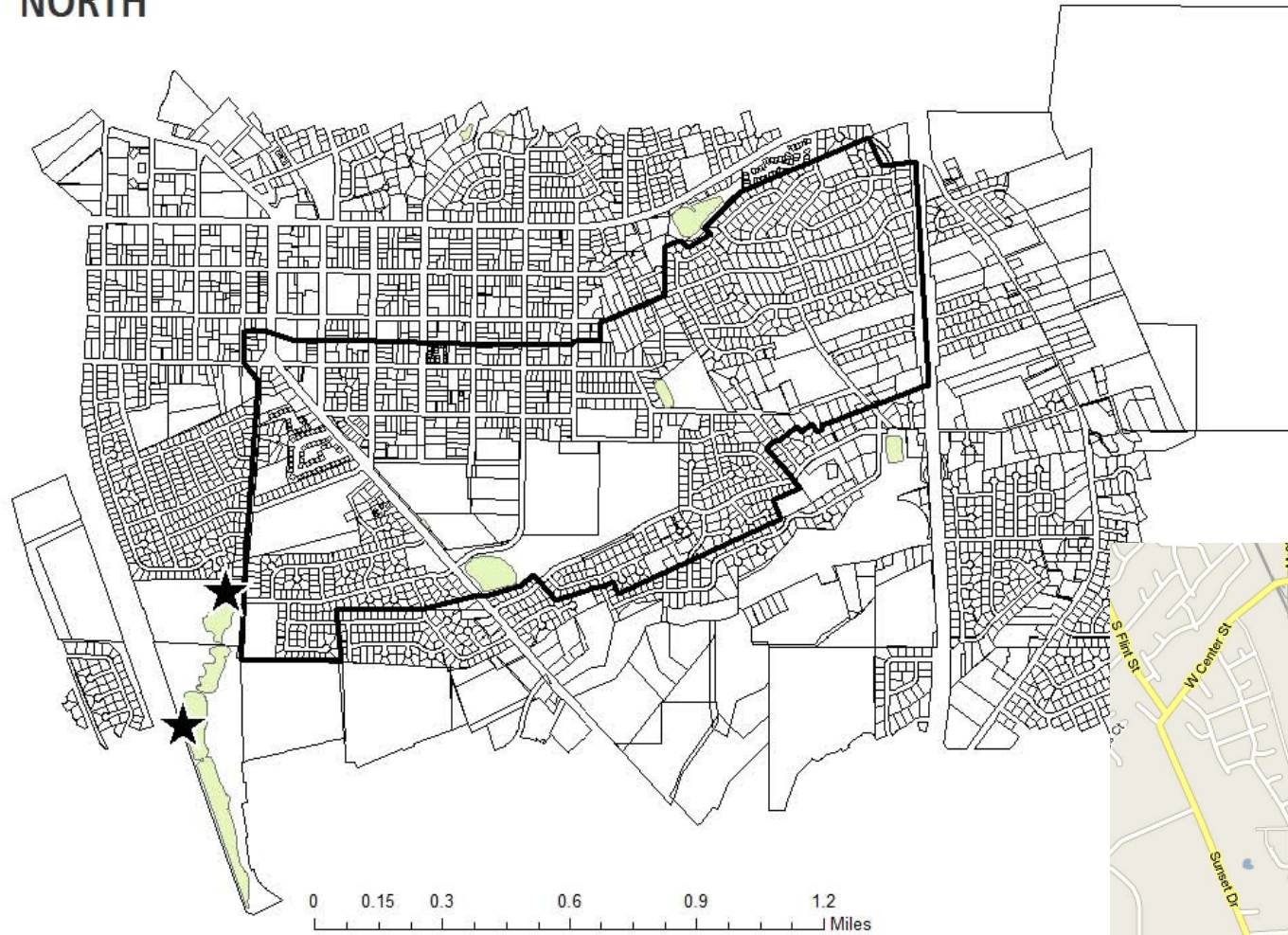
- Develop a sampling plan to begin next spring
- NPS has agreed to continue sample collection
- Explore microbial source tracking options to speciate *E. coli*

Utah Botanical Center Ponds

- Owned by USU
- 4 ponds and associated wetlands developed for stormwater retention
- Stocked with fish by DWR
- High recreational use in the summer
 - Fishing/float tubing
 - Kayaking
 - Swimming is prohibited

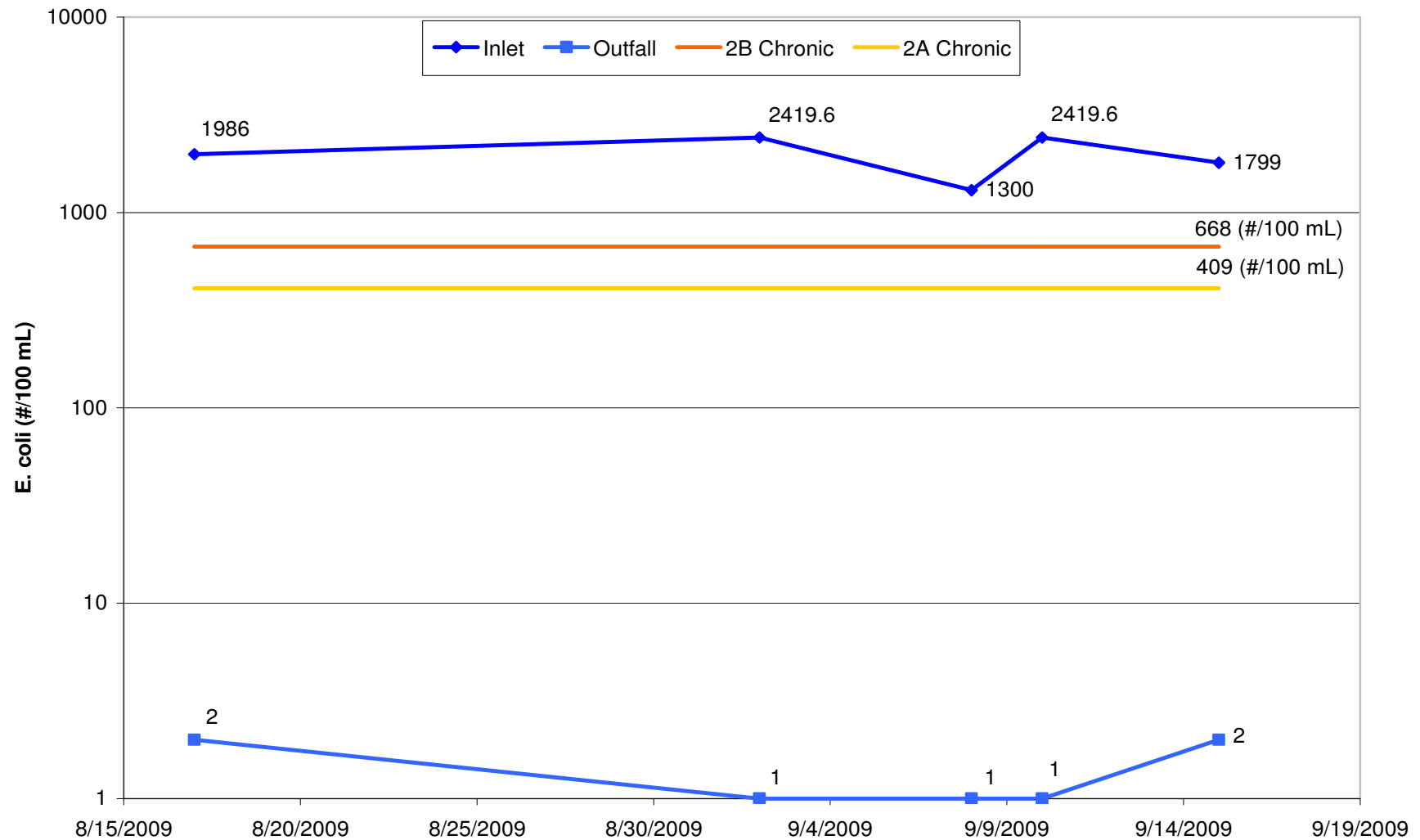


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Location of Utah Botanical Center and watershed (Dr. Michael Dietz, USU, 2009).

Utah Botanical Center Ponds



Data collected by Utah State University Extension using UTDWQ protocols

Next Steps...

- Dr. Dietz at USU Cooperative Extension has developed a plan to determine the source of E. coli using microbial source tracking
- Funding through the non-point source program (?)
- Application submitted 12/7/2009

UDWQ's Role

- Routine Monitoring (Probabilistic, Intensive, etc.)
- Cooperative monitoring
 - Training & technical expertise
 - Demonstration of Capability (annually)
 - Funding (~25k/year)

Under Development

- Statewide Monitoring Council
 - Web Page / Supporting Documentation/ SOPs
- TMDL's require source identification and quantification
- Guide implementation and pollution reduction strategies
- U of U (Dr. Ramesh Goel) currently developing microbial source tracking protocols (library independent)

What is Microbial Source Tracking?

- Method for identifying source of fecal contamination to surface water
- Library dependent methods
 - Expensive
 - Labor intensive
- Library independent methods
 - *Bacteroides*
 - Real-time PCR